Patent claims

1. A device for producing resist profiled elements comprising: an electron beam lithography system that produces an electron beam, the beam axis of which lies largely perpendicular to a resist layer in which the resist profiled element is produced, wherein the electron beam is adjustable with regard to the electron surface dose such that a resist profiled element that exhibits a non-orthogonal resist profile is produced as a result of irradiation with the electron beam.

2. Device according to claim 1, wherein the resist layer is applied to a substrate.

3. Device according to claim 1, wherein the resist layer comprises a negative resist.

4. Device according to claim 1, wherein the resist profiled element comprises a grating structure that consists of a parallel array of depressions and elevations.

5. Device according to claim 1, wherein a primary energy of the electron beam is continuously adjustable, whereby the lower limit of the primary energy is 1 KeV and the upper limit of the primary energy is 20 KeV.

6. Device according to claim 1, wherein the thickness of the resist layer is between 100 nm and 500 nm.

7. Device according to claim 1, wherein the electron surface dose focused on the resist is dependent on the primary energy of the electron beam, the electron scattering in the resist layer, the probe size, and the exposure time of the electron beam in the resist layer.

8. Device according to claim 5, wherein the primary energy of the electron beam in the resist layer defines a scattering cone having a diameter, whereby the diameter of the scattering cone is inversely proportional to the electron energy.

9. Device according to claim 1, wherein the resist layer comprises a resist that exhibits a gradation that, according to $S = (\frac{\delta d}{d_s})(\frac{\delta D}{D_{ges}})$ does not exceed the value of 1.5

10. Device according to claim 9, wherein the probe size is quasi-continuously adjustable.

11. Device according to claim 1, wherein the profile in the resist layer is scribable with a single probe size, whereby the probe size is smaller than the smallest possible structure size.

12. Device according to claim 1, wherein the electron surface dose is determined by the parameters of the device such as type of substrate, type of resist, resist thickness, development rule, and primary energy of the electron beam.

13. Method for producing resist profiled elements with an electron beam lithography system, which produces the electron beam with a primary energy, the beam axis of which is largely perpendicular to a resist layer in which the resist profile is produced, comprises the steps of:

- determining of parameters that influence an electron surface dose, and
- adjusting the electron beam with regard to the electron surface dose such that a resist profiled element that exhibits a non-orthogonal resist profile is produced as a result of irradiation of the resist layer by the electron beam.

14. Method according to claim 13, wherein the electron surface dose is defined by parameters such as the type of substrate, type of resist, resist thickness, development rule, and primary energy of the electron beam, and wherein the electron beam is adjusted according to these parameters.

15. Method according to claim 13, wherein the resist profile comprises a grating structure that consists of an array of depressions and elevations.

16. Method according to claim 13, wherein a gradation curve of the used resist is taken.

17. Method according to claim 13, wherein with the primary energy of the electron beam, the development process, and the resist thickness held constant, a gradation of the resist is applied as a function of a standard resist thickness in relation to the standard electron surface dose used is applied before electron irradiation.

18. Method according to claim 17, wherein the gradation $S=(\frac{M}{d_s})(\frac{\Delta D}{D_{ges}})$ does not exceed the value of 1.5.

19. Method according to claim 18, wherein surfaces in the resist layer are exposed with a variable electron dose, and wherein the appropriate electron dose for the pertaining and residual resist thickness is determined after the development process.

20. Method according to claim 13, wherein one element of the profile of the grating structure consisting of depressions and elevations is determined by the electron surface dose $D_n = \left(\frac{D_0}{(2n+1)}\right) \times \sum_{i=1}^{i=n} [f_e(x) + f_e(x - i \times b) + f_e(x + i \times b)]$ to be used

21. Method according to claim 13, wherein a diameter of a scattering cone is produced by the amplitude of the primary energy of the electron beam in the resist layer around the site of incidence of the electron beam, whereby the diameter of the scattering cone is inversely proportional to the primary energy of the electron beam.

22. Method according to claim 21, wherein the profile of the resist layer is scribed with a single probe size, whereby the probe size is smaller than the smallest possible structure size.

23. Method according to claim 21, wherein the probe size is quasi-continuously adjustable.

24. Method according to claim 21, wherein the electron surface dose is defined by the parameters such as type of substrate, type of resist, resist thickness, development rule, and primary energy of the electron beam.